The author strongly urged the development of new methods and instruments, in order that commercial aviation in England be made practicable. The island location, with the general unfavorable weather, especially during the winter months, has placed England in a rather disadvantageous position in commercial flying and, for that reason, there should be no cessation of activities in improving the methods and instruments used.—*C. L. M.*

THE EFFECT OF BAROMETRIC PRESSURE UPON ALTIMETER READINGS.

In discussing Prof. B. Melville Jones's paper on "Flying over clouds in relation to commercial aeronautics,"[1] Mr. J. R. Pannell brought up the question of the effect upon aircraft altimeter readings of changes in barometric pressure while the craft is in flight. This is especially important in relation to flying on cloudy or foggy days, or days with low visibility. The point seems worthy of emphasis.

A free balloon is, as its name implies, a balloon which rides freely in the air without means of propulsion or steering. It is interesting to note that, for the balloonist maintaining a nearly constant moderate elevation, the question of erroneous altimeter readings caused by difference of barometric pressure between his point of departure and destination, does not arise. It is a well-known fact that the so-called gradient winds blow in a direction parallel to the isobars at levels above those influenced by the friction of the earth's surface. If a balloon rises into such a current its course must also lie along some isobar. Of course, this is not strictly true when the balloon has flown so low that the surface friction has interfered with the wind direction, nor so high that the isobars are greatly different from those at the surface. This implies a range of about 2,000 feet and sometimes more (1,500 feet to 3,500 feet) in which the balloonist may fly without danger of erroneous altimeter readings. This is a point, to which, it is believed, free balloonists have not given much attention.

But, with dirigible balloons and airplanes, this relation does not obtain, for these craft can be steered quite independently in any direction, so that they may take off in one type of pressure formation and land in another. In such cases, it is of vital importance to consider the changes which may have taken place during the flight at the destination and at points along the route. For example, let us consider an airplane flying from New York to Chicago. Suppose the pressure at New York is 30.40 inches at the time of departure and that at Chicago is 30 inches at time of landing (such gradients are not uncommon). The New York field is about 600 feet lower than that at Chicago. If then, with the barometer at 30.40 inches in New York, the aviator sets his altimeter at 0, what will it read when he lands in Chicago? If he thinks only of the elevation of the land, he may assume that the answer would be 600 feet. But if he also considers the possible effect of changing pressure, he will discover that on a summer day, with a temperature of 75° F., a difference of 0.40 inch in the barometer is equivalent to a height of about 380 feet. Hence, instead of his altimeter reading 600 feet when he lands, it will read 980 feet.

The airplanes arriving at Chicago from the east fly across the lower end of Lake Michigan and are for about 20 miles above the lake. If there is a sheet of stratus cloud over the whole region and the aviator, aware that he is in the vicinity of Chicago, decides to descend through this sheet in order to locate himself, forgetting that he should allow for lower barometric pressure at Chicago, he may be unpleasantly surprised to find the waves of Lake Michigan facing him about 400 feet above the altitude he expected, and it may be too late to save himself from a dip in the lake. If he is over land, a crash may result.

Thus when a plane or dirigible is flying for long distances over land it is worth while for the pilot to form some opinion as to the possible changes in barometric pressure along his route and at his destination during the time he is in flight. This will enable him to make corrections for his altimeter readings which will be approximately correct, and certainly will keep him from experiencing such surprises as that mentioned above. The experience of Lieut. Edward V. Wales, who lost his life in the transcontinental air race in 1919 by crashing into a Wyoming mountain in a snowstorm, is typical of accidents which may result.

After all, the quantity measured by the altimeter is not altitude but pressure. Errors as great as 500 feet are easily conceivable on long flights, and when the flight is over a rough terrain with low clouds, it is a factor which can not be neglected.—*C. Le Roy Meisinger.*

[1] Abstract in this REVIEW, pp. 528–529.

METEOROLOGICAL ASPECTS OF THE RECRUITING TRIP OF THE NC-4.

By Lieut. J. B. ANDERSON.

[Pensacola, Fla., Sept. 7, 1920.]

SYNOPSIS.

The Navy Department, during the months September to January, 1919–20, detailed the naval seaplane *NC-4* to make a recruiting trip along the Atlantic coast from Maine to Florida, thence westward to New Orleans, up the Mississippi and Ohio Rivers to Cincinnati and return, ending the flight at Pensacola. The meteorological officer based his forecasts upon the daily weather map combined with the local conditions, and frequently consulted with Weather Bureau officials along the route. Much of the trip was made in unfavorable or stormy weather. Interesting experiments were made with the wireless apparatus concerning the static electricity before a rain, and in determining the direction of thunderstorms. The air was found to be steadier during the inland journey up the rivers than along the coast. The final flight extended to Rockaway Beach, N. Y., contrary to the original plan, and the flight was made in extremely rough weather.—C. L. M.

In describing the meteorological work on the recent recruiting trip of the *NC-4*, it is necessary to explain the nature of the trip so that the reader may understand the conditions under which the work was done, the variety of conditions met, and the necessity of keeping on the schedule.

During the summer of 1919 the Navy Department decided that during the recruiting campaign of the coming fall the *NC-4*, with as many of the crew which had piloted it across the Atlantic in its memorable flight as possible would probably be the best advertising agency at its command. A trip was planned starting from the United States naval air station, Rockaway Beach, N. Y., early in September. The plan was to fly to Portland, Me., then south, stopping at all of the larger cities, to Miami, Fla., thence to Pensacola, Fla., for a day or two, and then up the Mississippi and Ohio Rivers to Cincinnati, Ohio. This last leg was to be made in two long flights. After visiting the Ohio city for three days, the journey south was to start, stopping at all the principal cities, to New Orleans, La., fly across